

WHAT IS CLAIMED IS:

1 1. A method of controlling the concentration of  
2 positively charged antisite defects in a compound  
3 semiconductor comprising:

4 introducing acceptors into said semiconductor wherein  
5 said acceptors have an electronic energy level below the  
6 midgap energy level of the uncharged antisite defect.

1 2. A method as in claim 1 wherein the concentration of  
2 said acceptors is balanced with the concentration of the  
3 antisite defects.

1 3. A method as in claim 1 wherein said semiconductor is a  
2 III-V compound.

1 4. A method as in claim 1 wherein said acceptors are  
2 selected from the group consisting of C, Be, Zn, Mg, Fe,  
3 Cu, and Ni.

1 5. A method as in claim 1 wherein said acceptor is Be and  
2 said semiconductor is LT-GaAs.

1 6. A method of controlling the fraction of positively  
2 charged antisite defects in a compound semiconductor  
3 comprising:

4 introducing acceptors into said semiconductor wherein  
5 said acceptors have an electronic energy level below the  
6 midgap energy level of the uncharged antisite defect.

- 1 7. A method as in claim 1 wherein the concentration of  
2 said acceptors is balanced with the concentration of the  
3 antisite defects.
- 1 8. A method as in claim 1 wherein said semiconductor is a  
2 III-V compound.
- 1 9. A method as in claim 1 wherein said acceptors are  
2 selected from the group consisting of C, Be, Zn, Mg, Fe,  
3 Cu, and Ni.
- 1 10. A method as in claim 1 wherein said acceptor is Be and  
2 said semiconductor is LT-GaAs.
- 1 11. A material comprising:  
2 a) a compound semiconductor material having antisite  
3 defects therein; and,  
4 b) acceptor atoms in said semiconductor material  
5 wherein said acceptor atoms have an electronic energy level  
6 below the midgap energy level of the uncharged antisite  
7 defect.
- 1 12. A material as in claim 11 wherein the concentration of  
2 said acceptor atoms is balanced with the concentration of  
3 said antisite defects.
- 1 13. A material as in claim 11 wherein said semiconductor  
2 is a III-V compound.

1 14. A material as in claim 11 wherein said acceptors are  
2 selected from the group consisting of C, Be, Zn, Mg, Fe,  
3 Cu, and Ni.

1 15. A material as in claim 11 wherein said acceptor is Be  
2 and said semiconductor is LT-GaAs.

1 16. A method of producing a thermally stable compound  
2 semiconductor by introducing a balanced concentration of  
3 acceptors into said semiconductor.

1 17. A method as in claim 16 wherein the concentration of  
2 said acceptors is balanced with the concentration of the  
3 antisite defects.

1 18. A method as in claim 16 wherein said semiconductor is  
2 a III-V compound.

1 19. A method as in claim 16 wherein said acceptors are  
2 selected from the group consisting of C, Be, Zn, Mg, Fe,  
3 Cu, and Ni.

1 20. A method as in claim 16 wherein said acceptor is Be  
2 and said semiconductor is LT-GaAs.

1 21. A thermally stable semiconductor material produced  
2 according to the process of claim 16.